**Remarks/Arguments**

These remarks are in response to the Office Action dated November 12, 2004. This reply is timely filed.

At the time of the Office Action, claims 1-30 were pending in the application. Claims 1-30 were provisionally rejected under the judicially created doctrine of obviousness-type double patenting. Claims 1-30 were rejected under 35 U.S.C. §103(a). The rejections are set out in more detail below.

I. Objections to the Drawings

The drawings were objected to as failing to comply with 37 CFR 1.84(p)(4) due to informalities resulting from errors in the abstract. The abstract has been amended to correct such errors. Accordingly, the drawings are believed to comply with 37 CFR 1.84(p)(4).

II. Claim Objections

The Examiner has objected to claims 2-5 and 17-20 because claims 2 and 18-20 recite "said first fluidic dielectric". The Examiner has asserted that this recitation lacks antecedent basis.

With respect to claims 2, 17 and 18, applicants respectfully disagree. In particular, both independent claims 1 and 17 have a first recitation of "a fluidic dielectric". It is clear that the recitation "said first fluidic dielectric" in claims 2 and 18 refers to the first recitation of "a fluidic dielectric" introduced in the respective independent claims. Accordingly, proper antecedent basis is provided for "said first fluidic dielectric". Further, claims 2 and 18 each introduce "a second fluidic dielectric". Applicants believe that use of the term "said first fluidic dielectric" provides greater clarity for distinguishing the two fluidic dielectrics in the dependent claims.

Applicants have amended claims 19 and 20 to depend from claim 18, which provides a proper antecedent bases for "a second fluidic dielectric".

III. Double Patenting

Claims 1-30 were provisionally rejected under the judicially created doctrine of obviousness-type double patenting over claims 1-20 of copending Application No. 10/387,209. A terminal disclaimer in accordance with 37 CFR §1.321(c) is enclosed to overcome this rejection. Also enclosed is a Statement Under §3.73(b). Please charge the fee associated with the filing of a terminal disclaimer pursuant to Fee Code 1814 to Deposit Account No. 50-2884. Accordingly, withdrawal of the double patenting rejection is respectfully requested.

IV. Brief Review of Applicants' Invention

Prior to addressing the Examiner's rejections on the art, a brief review of applicants' invention is appropriate. The present invention relates to a method and a system for controlling a phase delay of an RF transmission line by coupling a fluidic dielectric to the RF transmission line. A phase delay of the RF transmission line can be selectively varied by adjusting a distribution of first and second fluidic dielectrics present in a serpentine fluid channel coupled to the RF transmission line. Further, the phase delay of the RF transmission line can be maintained constant as an operational frequency of the RF transmission line is varied. Moreover, the fluidic dielectrics can have a permeability and a permittivity selected for maintaining a constant characteristic impedance along an entire length of the RF transmission line.

The change in distribution of the fluidic dielectrics can cause a permittivity ($\varepsilon$) and/or a permeability ($\mu$) in channel segments proximate to the transmission line to vary. Since the propagation velocity of a signal is approximately inversely proportional to $\sqrt{\mu\varepsilon}$, the change in permittivity and/or permeability in a channel segment will cause the propagation velocity (and therefore the amount of phase delay introduced) to be adjusted on a portion of the transmission line which is coupled to the channel segment. For example, as $\sqrt{\mu\varepsilon}$ is increased in the channel segment, a propagation velocity of a signal on the transmission line will decrease. Similarly, as $\sqrt{\mu\varepsilon}$ is decreased in the channel segment, the propagation velocity will increase.

V. Claim Rejections on the Art

Claims 1, 2, 5-9, 11, 13-18 and 22-30 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,515,235 to Moller (hereinafter "Moller"), in view of U.S. Patent No. 3,701,058 to Smith (hereinafter "Smith") and U.S. Patent No. 3,566,311 to Buck (hereinafter "Buck"). Claims 3, 4, 12 and 19-21 are rejected under §103(a) as being unpatentable over Moller, in view of Smith and Buck, and further in view of U.S. Patent No. 4,450,500 to Wollenschlager (hereinafter "Wollenschlager").

Moller discloses an electrical circuit employing a strip conductor and a fluid having a selected dielectric property in contact with at least a portion of the strip conductor. A dielectric property of the fluid effects one or more transmission characteristics of the conductor. Notably, Moller discloses that the fluid compensates for circuit performance due to aging or heating. Col. 5, lines 1-4 and 26-27.

Smith discloses an apparatus including an expandable dielectric container in which dielectric fluid is disposed. The dielectric container is positioned in a waveguide to change the phase of electromagnetic waves propagated therein. The quantity of dielectric fluid introduced in the dielectric container is controlled to determine phase shift of electromagnetic waves.

Buck discloses a reciprocal ferrite film phase shifter that comprises first and second ferrite film layers. The phase shifter also includes an intermediate conducting film that defines orthogonal latching current conducting paths and serve to structure the ferrite film in a double toroid configuration. The conducting film is energized to establish a flow of latching current in a conducting path to flux drive the film to a remanent condition of magnetization in a desired orientation. Importantly, Buck does not teach or suggest the use of fluid dielectrics.

The Office Action states that it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Moller with Smith, Buck and Wollenshlager. The Applicants respectfully disagree. "To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the

reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations." MPEP § 2143.

A. The Cited References Do Not Teach or Suggest All the Claim Limitations

Claims 1 and 16 recite a structure defining a fluid channel having a serpentine configuration coupled to an RF transmission line along at least a portion of a length of the transmission line. Similarly, Claim 17 and 30 recite positioning a fluidic dielectric within a fluid channel having a serpentine configuration and being coupled to an RF transmission line along at least a portion of a length of the transmission line. None of the cited references disclose this limitation. The Examiner asserts that this limitation is taught by the combination of Moller, Smith and Buck. However, Applicants respectfully disagree because none of the references teach or suggest a fluid channel having a serpentine configuration.

The Examiner asserts that a serpentine fluid channel is suggested by Buck. However, not only does Buck fail to teach or suggest the recited serpentine fluid channel, Buck does not disclose a fluid channel anywhere in his specification. Instead, Buck discloses a microstrip 14 formed as a meanderline. A microstrip is not equivalent to the recited serpentine fluid channel. Indeed, Buck's microstrip operates in a completely different manner than the recited serpentine fluid channel. Whereas the microstrip is the conductor on which an RF signal is propagated, the recited serpentine fluid channel is not a conductor, but instead contains a fluidic dielectric.

In addition, Buck's phase shifter operates by applying magnetizing fields to a ferrite film proximately located to the meanderline. Col. 6, lines 36-39 and lines 52-57. "The amount of phase shift that is introduced is a function of frequency of the microwave energy, the circuit configuration, the characteristics of the ferrite, and the strength of the component of the D.C. magnetizing field in the direction of propagation of microwave energy through the microwave transmission circuit." Col. 1, lines 53-58. The meander line/microstrip 14 is arranged so that the principal direction of propagation of microwave energy through the meanderline 14 is that defined by long legs 14a of the line. Col. 6, lines 65-67. A first magnetizing field $H_{26}$ is oriented at 0° with respect to the

legs 14a. Col. 6, lines 72-75 through Col. 7, line 1. A second magnetizing field $H_{27}$ is oriented at 90° to the long legs 14a and parallel to short legs 14b. Col. 7, lines 1-6. Alternate pulsing of the magnetizing fields provides alternate directions of flux drive of the ferrite film to remanent states in the same orientations. Col. 7, lines 6-8. Thus, the meandering line configuration is implemented to provide either 0° or 90° orientation between the microstrip and the magnetizing fields.

In contrast, the serpentine configuration of Applicants' fluid channel is provided to finely control the distribution of fluidic dielectric that is proximate to the transmission line, thereby providing very fine control over the amount of phase shift introduced in the transmission line. One skilled in the art looking at the teachings of Buck would not find suggestion to control phase delay in this manner.

Claims 1 and 16 also recite at least one variable displacement fluid processor for changing a distribution of a fluidic dielectric within the fluid channel in response to a phase delay control signal. Similarly, claims 17 and 30 recite positioning the fluidic dielectric within the fluid channel to selectively control the coupling to vary a phase delay of said transmission line. The Examiner asserts that these limitations are disclosed by Smith. Again, Applicants respectfully disagree.

Smith discloses a computer which can control fluidic switches to fill or drain a dielectric container within a waveguide, but the computer only controls the quantity of dielectric fluid within the container. Importantly, there is no teaching or suggestion of changing a distribution of fluidic dielectric within the container. Indeed, Smith discloses an expandable container 11, or bladder, that fills or deflates like a balloon. There are no internal structures to change distribution of the dielectric fluid within the expandable container 11.

Finally, there is no teaching or suggestion that Smith's computer performs its functions in response to a phase delay control signal. In fact, no control signal is even disclosed by Smith.

Based on the foregoing deficiencies in the cited references, it is clear that the combination of Moller, Smith and Buck fails to teach or suggest every limitation recited in claims 1, 16, 17 and 30. Claims 3, 4, 12 and 19-21 are believed to be allowable at least based on their dependence on allowable base claims.

## VI. Conclusion

Applicants have made every effort to present claims which distinguish over the prior art, and it is believed that all claims are in condition for allowance. Nevertheless, Applicants invite the Examiner to call the undersigned if it is believed that a telephonic interview would expedite the prosecution of the application to an allowance. In view of the foregoing remarks, Applicants respectfully request reconsideration and prompt allowance of the pending claims.

Respectfully submitted,

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Date

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